

AMENDMENT

In the specification:

Please amend the specification as shown below:

Please replace the paragraph beginning on page 1 and ending on page 2 with the following paragraph, shown in marked-up form:

The benefits of known mechanical harvesting machines are diminished by problems encountered when such machines harvest vinous crops such as tomatoes, cucumbers, and peppers. With such crops which grow close to or on the ground, vines, rocks and dirt often clog the chains of conventional chain-type conveyors used in such machines. Accordingly, the machine must be periodically shut-down and be cleared of vines, rocks and other debris.

Please replace the paragraph beginning on page 2 and ending on page 3 with the following paragraph, shown in marked-up form:

In one of its aspects, this invention provides harvesting apparatus for detaching and collecting fruits from vinous plants during travel through a growing field, where the apparatus preferably includes a preferably longitudinally elongated frame adapted to be pulled by a tractor. In this aspect of the invention, the apparatus preferably includes at least one pair of mutually facing movable arrays of preferably resilient finger members. The mutually facing arrays preferably are considered to ~~have~~ each have mutually perpendicular horizontal and vertical axes, with the horizontal axes of the two arrays being substantially parallel to the

ground and with the vertical axes of each array being substantially parallel with each other. Preferably, the arrays rotate about their respective horizontal axes, with one array rotating in the clockwise direction and the second array rotating in the counterclockwise direction. When viewed from above, the mutually facing arrays preferably form a "V"-shape where plants enter the space between the arrays at the wide end of the "V". Upwardly traveling resilient finger members of the two arrays comb the vines along the longitudinal length of the arrays and along the vertical height of the arrays to pick the fruit from the vines.

Please replace the third complete paragraph on page 4 with the following paragraph, shown in marked-up form:

In still another of its aspects, this invention embraces a method of harvesting including the steps of advancing a harvesting a device through a growing field, scoopingly urging plants towards an opening between mutually facing arrays of finger members, advanceably positioning the mutually facing moveable arrays of finger members on opposite sides of plants containing fruits to be harvested, rotating the mutually facing arrays of finger members whereby one array rotates in a clockwise direction and the other in a counter-clockwise direction so that both arrays move upwardly in a region in which the arrays are mutually facing and are above the position of the plants growing in the growing field from which fruits are to be harvested thereby upwardly sweeping the plants with the finger members to strippingly remove fruits from the plants. The method further preferably includes transversely sweeping the growing ground during travel of the

H3
apparatus thereover to brushingly gather detached fallen fruits off of the ground and into the region within which the arrays face one another so the fruits may be carried to a collection container.

Please replace the paragraph description on page 7 of Figure 1 with the following paragraph, shown in marked-up form:

H4
Figure 1 is a left side elevation in schematic form of a portion of a first embodiment of vegetable harvesting apparatus manifesting aspects of the invention.

Please replace the last complete paragraph on page 8 with the following paragraph, shown in marked-up form:

H5
Referring to the Figures in general and to Figures 1 and 5 most particularly, a vinous crop harvesting apparatus 10 manifesting aspects the invention is shown. Apparatus 10 travels through a growing field in the direction indicated by arrow T in Figures 1, 6 and 10.

Please replace the first complete paragraph on page 9 with the following paragraph, shown in marked-up form:

H6
Apparatus 10 comprises a frame 30 (not visible in Figure 5) adapted to be pulled by a tractor (not shown). Frame 30 preferably includes a longitudinal beam 32 on which four wheel assembly housings 22 and two arrays 70, 71 (only arrow 70 is

HG
visible in Figure 1) of resilient finger members 40 are preferably mounted. The four wheel assembly housings 22 mount preferably to frame 30 and particularly to the longitudinal beam 32 portion thereof via support flange members 34 illustrated in Figure 1.

HJ
Please replace the second complete paragraph on page 9 with the following paragraph, shown in marked-up form:

As an alternate approach, apparatus 10 may be built around a universal farm equipment supporting member adapted to pass through the growing field on tired wheels and having a plurality, desirably four, pneumatically actuated arms extending radially outwardly therefrom. At the end of the each of the pneumatically actuated arms are mounted wheel assembly housings similar to those identified as 22 in Figure 1. In such case, the fruit stripping structure including preferably resilient fingers 40 is desirably mounted between the respective forward and aft wheel assemblies 22. This particular structure utilizing the universal farm equipment support assembly is not illustrated in the drawings.

KJ
Please replace the third complete paragraph on page 9 with the following paragraph, shown in marked-up form:

In the embodiment illustrated in Figure 1, apparatus 10 has wheel assembly housings 22 at the forward and aft extremities thereof. Support flange members 34 provide connection not only to the longitudinal beam 32, but also provide support for a track 52, shown best in Figure 5, within which endless chains 60

ride as chains 60, visible in Figures 4 and 10, carry bars 50 along an endless path as described in more detail below.

Please replace the paragraph beginning on page 9 and ending on page 10 with the following paragraph, shown in marked-up form:

Referring more particularly to Figures 2 and 3, each wheel assembly housing 22 preferably includes a hydraulic piston-cylinder combination 24 connected to a tubular extension member 25 which in turn preferably connects to a wishbone-type wheel axle support 27 on which a wheel 20 preferably is rotatably mounted. The hydraulic piston-cylinder combination 24 provides a height adjustment function which may be used to maintain frame 30 at a desired height and/or orientation relative the ground as apparatus 10 moves through a growing field. Hydraulic piston-cylinder combination 24 extends or retracts the piston member thereof, thereby raising or lowering the parts of the harvesting apparatus 10 attached to frame member 30 when on uneven or sloped ground. Wheel assembly housings 22 with hydraulic piston-cylinder combinations 24 forming parts thereof are provided on either side of apparatus 10 so that ~~the~~ apparatus 10 may be positioned for travel along the side of a hill with one side of ~~the~~ apparatus 10 higher than the remaining side. Extension or retraction of the piston members of piston-cylinder combinations 24 may be provided by manually powered hydraulics, by manual screw adjustments or by automatic height sensing devices connected to and actuating hydraulic valves to effectuate dynamic height adjustment.

Please replace the paragraph beginning on page 10 and ending on page 11 with the following paragraph, shown in marked-up form:

A/10
Referring more specifically to Figure 3, the effective independent constructions of the two sides of the harvesting apparatus is illustrated. A horizontal spacing bar 54 is adjustable to provide varying width between the two illustrated wheel assembly housings 22. Most desirably, connection of adjustable horizontal spacing bar 54 to respective wheel assembly housings 22 is pivotal so that the respective wheel assembly housings 22 may move independently one of another as the harvesting apparatus traverses rocky or uneven ground.

H/11
Please replace the first complete paragraph beginning on page 11 with the following paragraph, shown in marked-up form:

Referring more specifically to Figures 4, 5 and 6, in one preferred embodiment the arrays 70 and 71 each comprise elongated horizontal bars 50 attached at each bar end to respective endless chains 60 mounted in respective tracks 52 visible in Figures 5 and 6. Preferably resilient finger members 40 are preferably attached to elongated horizontal bars 50, which are hidden by tracks 52 in Figures 5 and 6.

H/12
Please replace the second complete paragraph beginning on page 11 with the following paragraph, shown in marked-up form:

The resilient finger members 40 preferably extend outwardly transversely from bars 50 and form a-combing array 70, 71 of finger members as illustrated

generally in Figures 1, 4, 5, 6, 10, 11, 12 and 13. The arrays 70, 71 of preferably resilient finger members 40 are positioned to move vertically upwardly in their facing dispositions, as apparatus 10 passes through the growing field. Upward movement of the arrays 70, 71, when in their facing positions as shown in Figure 5, results in preferably resilient finger members 40 combing the plants to thereby remove fruits from the vinous plants as the fruits are contacted by finger members 40. As shown and discussed herein, plants with fruits are designated generally 80 and defruited plants are designated generally 84.

Please replace the first complete paragraph beginning on page 12 with the following paragraph, shown in marked-up form:

In an alternate embodiment shown in Figure 8, a resilient finger member is denoted 4143 and has two holes at the base through which attachment pins or rods 45 mount. Preferably all of the embodiments of resilient finger members 40, 43, and 44 are rubber. Preferably, the resilient finger members may be bent upwards, relative to the direction of travel of the fingers, as fingers 70, 71, 40 or 43 or 44 move upwardly with the vinous crop which is being harvested positioned therebetween; such curvature is illustrated in resilient finger member 44 depicted in Figure 9. Within the contemplation of the invention are additional resilient finger member shapes, such as a hook-shapes, which may be particularly suited to the harvesting of bell peppers or other similar fruit.

Please replace the second complete paragraph beginning on page 12 with the following paragraph, shown in marked-up form:

The resilient finger members 40 or 43 or 44 of the two arrays 70, 71 may be positioned opposite one another or may be offset from corresponding finger members on the opposite array so that the finger members may effectively interdigitate either vertically or horizontally thereby to create a finger-type mesh for the capture of fruits as those fruits are stripped from the vinous plants due to the upward motion of the arrays 70, 71 and associated finger members 40 or 43 or 44 as the supporthorizontal bars 50 or fabric webs travel along the endless paths defined by chains 60 traveling in tracks 52.

Please replace the paragraph beginning on page 12 and ending on page 13 with the following paragraph, shown in marked-up form:

In an additional embodiment of the invention, resilient finger members 40 may have differing lengths as indicated by the dotted line configurations of some of finger members 40 in Figure 6. In particular, resilient finger members 40 are contemplated to be longer where the plants enter the mutually facing arrays 70, 71 depicted on the left in Figure 6 as being at the front of the machine, and are contemplated to be shorter were the plants exit the mutually facing arrays 70, 71 towards the rear of the machine, depicted to the right in Figure 6.

Please replace the first complete paragraph beginning on page 13 with the following paragraph, shown in marked-up form:

In the preferred embodiment of the invention, the two arrays 70 and 71 of resilient finger members 40 are preferably arranged cooperatively side-by-side as depicted in Figure 5. A motor 100, depicted in Figure 4, or power take-off from the pulling tractor (not shown), preferably engages endless chains 60 located in tracks 52, moving chains 60 and hence the connected aforementioned elongated horizontal bars 50 together with attached resilient finger members 40 or 43 or 44. The ~~m~~Motor 100 drives endless chains 60 carrying each array 70 and 71 in opposite directions (when considered looking from the front to the rear of apparatus 10) denoted by arrows U and V in the drawings, particularly in Figure 5, such that resilient finger members 40 or 43 or 44 of each of arrays 70 and 71 move in an upward direction denoted Z in the drawings including Figure 5, when the resilient finger members traverse space between the mutually facing moving arrays 70 and 71.

 Please replace the paragraph beginning on page 13 and ending on page 14 with the following paragraph, shown in marked-up form:

 As further depicted in Figure 5, fruit lying on the ground 86 is desirably sweepingly engaged by resilient finger members 40 and swept along respective directions of finger member travel, U or V. This fallen fruit is swept initially in a horizontal direction at the bottom of arrays 70, 71 and is then drawn or carried in a vertical direction, as indicated by Arrow Z, upwardly in the space separating arrays 70 and 71 where those arrays face one another and are closely spaced. In addition, fruit still attached to the vine is engaged and removed from the vine by

H/7
resilient finger members 40 as resilient finger members 40 comb the vinous plants in the generally upward direction, indicated by Arrow Z. Both fruit lifted from the ground and fruit combingly removed from the vine by apparatus 10 are transported upwardly by resilient finger members 40 in the space between arrays 70 and 71. Fruit carried by arrays 70 and 71 is removed from arrays 70 and 71 as the arrays move through arcs at the upper extremity of array travel.

Please replace the first complete paragraph beginning on page 14 with the following paragraph, shown in marked-up form:

A/D
Vertical adjustment of the arrays is preferably facilitated by piston-cylinder combinations 24 of wheel assembly housings 22, illustrated in Figures 1 and 2. If desired, the piston-cylinder combinations 24 may be adjusted so as to raise the arrays 70, 71 sufficiently far from the ground 86 that no sweeping along the ground 86 occurs. In such case, fruit lying on the ground 86 remains on the ground. This may be desirable if the fruit is spoiled or bruised.

H/9
Please replace the first complete paragraph beginning on page 15 with the following paragraph, shown in marked-up form:

Fruit is desirably ejected upwardly when the fruit reaches the apex between array 70 and array 71 wherein dislodging of the fruit is aided by a high velocity blower that lifts and guides the fruit either to a conveyor belt 3438 as depicted in Figure 5 or to another collection system.

Please replace the third complete paragraph beginning on page 15 with the following paragraph, shown in marked-up form:

In another aspect of the invention, spatial adjustability between array 70 and array 71 accommodates variable row spacing used in the farming industry. Row spacing used in the farming industry typically ranges from 12 to 40 inches. Therefor arrays 70 and 71 may be laterally adjusted to increase or decrease the space between interior vertically extending facing portions 72 and 74, shown in Figures 5 and 11, of arrays 70 and 71 to accommodate wider or narrower rows.

Please replace the fifth complete paragraph beginning on page 15 with the following paragraph, shown in marked-up form:

In addition to accommodating variable row sizes, lateral adjustability of arrays 70 and 71 accommodates variations in the moisture content of the plants. Towards harvest day, moisture in a plant changes, thus requiring the arrays 70 and 71 to be adjusted closer or farther apart depending on conditions.

Please replace the first complete paragraph beginning on page 16 with the following paragraph, shown in marked-up form:

In another aspect of the invention, a plow snout 18 is frontwardly positioned and centrally located between arrays 70 and 71. Tip 16 of plow snout 18 is coincident with longitudinal axis A, depicted by vertical arrow Z designated 14 between arrays 70 and 71 in Figure 5. Snout 18 guides and lifts plants thereby facilitating positioning of plants for entrance between mutually facing arrays 70 and 71.

Please replace the second complete paragraph beginning on page 16 with the following paragraph, shown in marked-up form:

H23
Referring to Figure 10, it is further preferable that upward ejection of peppers or other vegetables from arrays 70 and 71 be facilitated by a high velocity blower 3656. Preferably, high velocity blower 3656 is adjustably positioned and frontally located to create airflow from the front towards the back of apparatus 10, to lift and guide peppers or other vegetables towards a collection system such as a conveyor belt 38 depicted in Figure 10 or other collection system. The direction of air flow expelled from high velocity blower 3656 is designated D in Figure 10.

Please replace the third complete paragraph beginning on page 16 with the following paragraph, shown in marked-up form:

H24
Referring still to Figure 10, for convenience of reference apparatus 10 may be considered to be divided into an upper area M' and a lower area M'' by a horizontal axis M. In one aspect of the invention, high velocity blower 3656 is adjustable to create a bi-level velocity wind system wherein the adjustable position and head of high velocity blower 3656 is designated by directional arrow N in Figure 10.

Please replace the paragraph beginning on page 16 and ending on page 17 with the following paragraph, shown in marked-up form:

H25
Preferably, high velocity blower 3656 may be positioned to create a current of generally upwardly directed low velocity air within lower area M'' to gently

facilitate upward movement of peppers or other vegetables in the area between resilient finger members 40 thus easing peppers or other vegetables upward towards upper area M' without crushing the peppers or other fruits between resilient finger members 40. Once ejected from between the arrays 70 and 71 into upper area M', a high velocity air current ~~desirable~~desirably guides the peppers substantially horizontally towards a collection system, such as a conveyor belt 38. Thus, high velocity blower 3656 minimizes discharge and re-entry of peppers or other vegetables into the space between arrays 70 and 71 and further assists in the pepper or other vegetable collection process.

 Please replace the first complete paragraph beginning on page 17 with the following paragraph, shown in marked-up form:

 ~~The~~aApparatus 10 preferably comprises a frame member preferably adapted to be pulled by a tractor via a hitch with a frame member, preferably ~~includes~~a single longitudinal frame member, to which arrays 70, 71 may be mounted and the height of which adjusted, desirably by the wheel assemblies 22 with piston-cylinder combinations 24 in the drawings.

 Please replace the second complete paragraph beginning on page 17 with the following paragraph, shown in marked-up form:

 The apparatus preferably further includes a conveyor to receive separated fruits 82 from facing arrays 70, 71 and transport these separated fruits 82 to one or more intermediate conveyors or to a discharge position or to a gathering container, as

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desired. All of this is consistent with the disclosure of U.S. patent 6,282,877, referenced above, particularly the description appearing in columns 7 and 8 thereof.

Please replace the paragraph beginning on page 17 and ending on page 18 with the following paragraph, shown in marked-up form:

An important aspect of the invention is the adjustability of the bottom portion of the array to provide greater or lesser width of the moving array traveling substantially horizontally parallel with the growing ground and transversely to the direction of travel across the growing ground of the harvesting apparatus.

N 28
Specifically, idler sprocket 66 is preferably adjustably moveable from the position illustrated in Figure 5 to a position vertically displaced therefrom. In the position illustrated in Figure 5, a moving web 74, optionally provided in place of or in addition to bars 50, substantially sweeps across the growing ground parallel to the ground as the web 74 travels first around adjustable, moveable idler sprocket 66 and then around fixed idler sprocket 68. This sweeping action of the web 74 transversely across the growing ground relative to the direction of travel of the harvesting apparatus, sweeps fruits which have dropped from the vines to the ground into the gathering area where those fruits may be carried upwardly by flexible finger members 40 and discharged from between the moving arrays onto a fruit conveyor 3438 illustrated in Figure 5.

Please replace the paragraph beginning on page 18 and ending on page 19 with the following paragraph, shown in marked-up form:

The adjustability of the stripper head portion of the invention is a key feature. Such adjustability permits the stripper head to be moved so as to separate moveable arrays 70, 71 from one another or to place moveable arrays 70, 71 close to one another in a parallel disposition or to position moveable arrays 70, 71 in a V-shape, such as illustrated in Figure 6, with the mouth of the V facing in the direction of travel of the harvesting apparatus. The V configuration facilitates gathering of bushy fruit carrying vine-type crops into the area between the facing moveable arrays. The converging V-shape facilitates more complete gathering and stripping of the ripe fruit from the vines than would otherwise be accomplished. The adjustability feature is preferably provided by a system of bolts which are slidably moveable in suitable slots and serve as the mounting and securing means for the stripper head defined by the moveable arrays on the frame. Such adjustability results in the ability to move the stripper head components, namely, the two moveable arrays which travel on their endless paths, and to reposition those arrays at different spacings from one another, which is important as harvesting conditions change during the work day and from day to day.

Please replace the first complete paragraph beginning on page 19 with the following paragraph, shown in marked-up form:

A further important feature of the invention is the provision of one or more fans working to blow detached fruits away from the moveable arrays thereby

A 30 facilitating the gathering of the fruits without the stems, leaves and other assorted chaff which inherently results from the stripping process. One desirable position of such a fan is that illustrated for a fanblower 56 in Figures 10, 12 and 13.

Please replace the paragraph beginning on page 19 and ending on page 20 with the following paragraph, shown in marked-up form:

Desirably, a shroud 59 may be positioned as illustrated in Figure 11 where the tips of the shroud desirably slightly interferingly contact and engage the tips of finger members 40 traveling on arrays 70, 71, thereby to disengage any fruits which remain caught within fingers 40 of arrays 70 and 71 after the stripping operation.

A 31 As an alternative to or complementary with shroud 59, a pair of venturis 65 having nozzles 6364 may be provided to dislodge fruits which are carried by or caught in between fingers 40 of moveable arrays 70, 71 as those arrays move around on drive sprockets 62. Additional combinations of shrouds 6359 and venturi 65 may be provided working cooperatively to engage fingers 40 of arrays 70, 71 as those arrays pass around drive sprocket 62 to further facilitate removal of fruits from the moving arrays, all as illustrated in Figure 11. All of this together with air currents 67 created by fans 59blowers 56 work to remove fruits from the traveling arrays and position the fruits for conveyance to a gathering position such as by conveyor 5838 illustrated in Figure 13.

L Please replace the first complete paragraph beginning on page 20 with the following paragraph, shown in marked-up form:

Referring to Figure 13, fanblower 56-1 creates a venturi resulting in an air stream flowing up, through and around moveable arrays 70, 71. This creates a lifting effect for the fruit helping to remove the fruit from the fingers of the arrays. FanBlower 56-2 may also be used in the removal of heavy fruit, but is believed not to be needed for most conditions.

Please replace the second complete paragraph beginning on page 20 with the following paragraph, shown in marked-up form:

A rotating pipe roller 90 prevents dirt build up and plug ups as dust and small dirt particles tend to be carried due to the pneumatic action. Conveyor belt 5838 is preferably driven by conveyor belt drive sprocket 92 illustrated in Figure 12 with conveyor belt 5838 moving in the direction indicated by arrow C in Figure 12. A shield 94, depicted in Figure 13, prevents detached fruits from escaping from the lower end of conveyor 58.